



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

December 5, 2008

TVA-BFN-TS-446

10 CFR 50.90

U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555-0001

In the Matter of)
Tennessee Valley Authority)

Docket No. 50-259

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - TECHNICAL SPECIFICATIONS (TS) CHANGE TS-446 - SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) - CYCLE 8 OPERATION - RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) (TAC NO. MD9255)

By letter dated July 18, 2008 (ADAMS Accession No. ML082050412), TVA submitted a request for a TS change (TS-446) to license DPR-33 for BFN Unit 1. The proposed TS change reduces the numeric values of SLMCPR in TS Section 2.1.1.2 for single and two reactor recirculation loop operation to incorporate the results of the Unit 1 Cycle 8 SLMCPR analysis. On November 6, 2008, NRC issued a RAI (ML083090404) on TS-446. This submittal provides a response to the subject RAI.

Enclosure 1 is the proprietary version of the RAI response. Some of the information in Enclosure 1 is considered proprietary and Global Nuclear Fuels (GNF) requests that this proprietary information be withheld from public disclosure in accordance with 10 CFR 9.17(a)(4) and 10 CFR 2.390(a)(4). A GNF affidavit supporting this request is included in Enclosure 3. Enclosure 2 provides a non-proprietary version of the RAI response.

TVA has determined that the additional information provided by this letter does not affect the no significant hazards considerations associated with the proposed TS change. The proposed TS change still qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

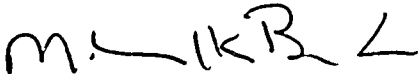
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December 5, 2008

No new regulatory commitments are made in this submittal. If you have any questions about this TS change, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 5th day of December, 2008.

Sincerely,

A handwritten signature in black ink, appearing to read "M. K. Brandon". The signature is stylized with a large "M", a small "K", and a large "B", followed by a checkmark-like flourish.

M. K. Brandon
Interim Manager of Licensing
and Industry Affairs

Enclosures:

1. Response To Request For Additional Information (RAI) (Proprietary Information Version)
2. Response To Request For Additional Information (RAI) (Non-Proprietary Information Version)
3. GNF Affidavit

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Enclosures

cc (Enclosures):

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Eva A. Brown, Senior Project Manager
U.S. Nuclear Regulatory Commission
MS 08G9A
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Eugene F. Guthrie, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

NON-PROPRIETARY INFORMATION

Enclosure 2

Browns Ferry Nuclear Plant (BFN) Unit 1

**Technical Specifications (TS) Change TS-446
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Cycle 8 Operation**

Response to Request for Additional Information (RAI)

Non-Proprietary Information Version

NON-PROPRIETARY INFORMATION

NRC RAI 1

Provide the number of months Unit 1 operated during Cycle-7, and the number of months expected for Cycle-8. Describe the key differences in core design and/or any other important difference between the Cycles 7 and 8 that support permitting Cycle-8 to be operated at a lower safety limit minimum critical power ratio (SLMCPR) value.

Response to RAI 1

BFN 1 Cycle 7 operated for 17 months. BFN 1 Cycle 8 is planned to operate for 24 months. The fresh bundles in Cycle 8 tend to have more peaked pin-to-pin R factor distributions than the Cycle 7 designs, which results in a lower R-factor Importance Parameter (RIP) value for Cycle 8. In addition, the radial power distributions of the Cycle 8 core tend to also be more peaked compared to Cycle 7, which leads to a lower MCPR Importance Parameter (MIP) value for Cycle 8. The combination of the two leads to fewer rods contributing to boiling transition, which allows the safety limit MCPR to be reduced for Cycle 8. The MIP and RIP values for the two cycles are shown on page 17 of 23 in Table 3 of Enclosure 3 to the July 18, 2008, TS-446 submittal (ADAMS Accession No. ML082050412).

NRC RAI 2

Although Cycle-8 SLMCPR analysis was performed assuming approval of extended power uprate (EPU), the EPU may not be approved. Address the number of months at current licensed thermal power Unit 1 is capable of operating before changes to the operating strategy (i.e. major control rod pattern adjustments, core flow, etc.) would be required.

Response to RAI 2

SLMCPR analyses were performed for BFN 1 Cycle 8 for the Current Licensed Thermal Power (CLTP) level (3458 megawatts thermal (MWt)) and for the EPU power level (3952 MWt). The resulting SLMCPR calculations for EPU bound the CLTP results. A mixed power history would have no effect on the SLMCPR calculation. Therefore, the SLMCPR values requested in TS-446 are conservative for Unit 1 Cycle 8 irrespective of the duration of operations at CLTP.

NRC RAI 3

Should Unit 1 operate during Cycle-8 at less than EPU conditions for a prolonged period, changes in control rod pattern and core flow could change the core power distribution and result in a increase in the SLMCPR. Increases in SLMCPR would be possible through extended changes in operating strategy in two ways:

- Insertion of additional control rods could cause the axial power shape of individual rods and bundles to become more outlet-peaked, and
- Reduction of power at the center of the core could result in a flatter radial power distribution, placing more fuel rods near boiling transition in the limiting SLMCPR scenario.

NON-PROPRIETARY INFORMATION

It is stated in Section 2.4 of Enclosure 3 of the submittal that the limiting power shapes were not found in Cycle-8 and, therefore, no power shape penalties were applied to the calculated Cycle 8 SLMCPR values. Justify why no power shape penalties will be required should a different operating strategy be necessary.

Response to RAI 3

SLMCPR analyses were performed for BFN 1 Cycle 8 for the CLTP power level (3458 MWt) and for the EPU power level (3952 MWt). The resulting two recirculation loop operating (TLO) SLMCPR Monte Carlo calculations for EPU match the Monte Carlo calculations for CLTP. A mixed power history has no effect on the SLMCPR final results. There were no limiting power shapes for either CLTP or EPU power levels, and, therefore, would not be present in a mixed power history core.

NRC RAI 4

Clarify whether the SLMCPR values of 1.07 for double loop operation (TLO) and 1.09 for single-loop operation (SLO) already include the EPU penalty of 0.02, approved in the NRC staff safety evaluation dated February 6, 2007, or whether the penalty is added on top of the proposed values of SLMCPR.

Response to RAI 4

The reported SLMCPR values for TLO and SLO of 1.07 and 1.09 respectively include a 0.02 adder.

NRC RAI 5

Provide the exposure dependent SLMCPR values for the limiting fuel bundle. Address which fuel type (GE13 or GE14) is limiting for Cycles 7 and 8.

Response to RAI 5

The following table contains the exposure dependent calculated Monte Carlo EPU results for Cycles 8 and 7 for beginning-of-cycle (BOC), middle-of-cycle (MOC), and end-of-cycle (EOC) conditions. All bundles contributing to the calculated Monte Carlo EPU results for Cycles 8 and 7 come from GE14 bundles (i.e., GE14 bundle types are limiting for Cycle 7 and 8).

	C8	C7
TLO BOC	[[]]	[[]]
TLO MOC	[[]]	[[]]
TLO EOC	[[]]	[[]]

NON-PROPRIETARY INFORMATION

NRC RAI 6

The current Technical Specification surveillance requirement (SR) 3.3.1.1.7 requires that local power range monitors (LPRMs) be calibrated at an interval of 1000 megawatt day per ton of average core exposure. Provide the following additional information:

- c. Clarify whether the LPRM calibration interval will be changed from the current requirements.
- d. If the LPRM calibration interval will be increased from the current requirement, then explain any changes needed to the SLMCPR calculation to account for increased LPRM uncertainty.

Response to RAI 6

- c. TVA will follow the current BFN Unit 1 TS SR 3.3.1.1.7 surveillance interval, which specifies that the LPRMs are calibrated every 1000 megawatt days per ton.
- d. A separate TS change would be required to extend the LPRM calibration interval. To support such a TS change, the uncertainties would be modified to account for the increased LPRM uncertainty and a new SLMCPR calculation performed. At present, TVA has no plans to submit an LPRM calibration interval extension TS change in the near future.

Enclosure 3

Browns Ferry Nuclear Plant (BFN) Unit 1

**Technical Specifications (TS) Change TS-446
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Cycle 8 Operation**

GNF Affidavit

Global Nuclear Fuel – Americas

AFFIDAVIT

I, **Anthony P. Reese**, state as follows:

- (1) I am Reload Licensing Manager, Fuel Engineering, Global Nuclear Fuel–Americas, LLC (“GNF-A”), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in the attachment, “NRC Requests for Additional Information (RAI) for Browns Ferry 1 Cycle 8 Safety Limit MCPR Technical Specification Change Request” dated November 2008. GNF proprietary information is identified by a dotted underline inside double square brackets. [[This sentence is an example.^{3}]] In each case, the superscript notation ^{3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.
- (3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act (“FOIA”), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for “trade secrets” (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of “trade secret”, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
 - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;
 - b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
 - c. Information which reveals aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;
 - d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

- (5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- (8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A.

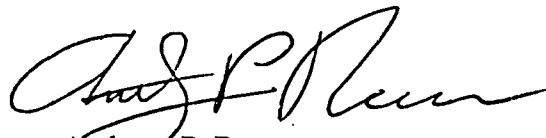
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 21st day of November 2008.



Anthony P. Reese
Reload Licensing Manager, Fuel Engineering
Global Nuclear Fuel – Americas, LLC